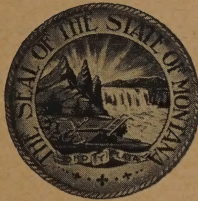


AIDS

IN THE

Production of Clean Milk

BY
W. J. BUTLER, D. V. S.



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The Montana Livestock Sanitary Board acknowledges and expresses its appreciation to the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture for the privilege of reproducing illustrations and plans for dairy barns contained in this pamphlet.

MONTANA LIVESTOCK SANITARY BOARD,

W. J. BUTLER,
Executive Officer.

Aids in the Production of Clean Milk

By W. J. Butler, D. V. S.

It has been proved by the Dairy Division of the United States Bureau of Animal Industry that the three essential factors in the production of milk of low bacterial content, named in the order of their importance, are as follows:

FIRST. THE USE OF STERILIZED UTENSILS.

SECOND. CLEAN COWS, PARTICULARLY THE UDDERS AND TEATS.

THIRD. USE OF THE SMALL-TOP MILK PAIL.

There is a fourth factor that must be observed strictly if the bacterial content is to be kept low and the milk delivered to the consumer in the same condition as when it left the udder of the cow, and that is:

FOURTH. IMMEDIATE COOLING AND HOLDING MILK AT 50°F OR LOWER.

There is also an important factor in personal cleanliness. A person who is unclean or careless in his or her habits never will produce a clean milk of low bacterial count. Unscrupulous cleanliness in every detail is the all important factor in the production of clean wholesome milk.

It will be observed that expensive barns and elaborate equipment are not necessary in the production of clean milk. They assist in making its production easier, but are not a prime essential. If the four essential factors as outlined are followed, it is possible for any person with clean personal habits to produce a milk that will pass inspection in any land or community.

THE USE OF STERILIZED UTENSILS:

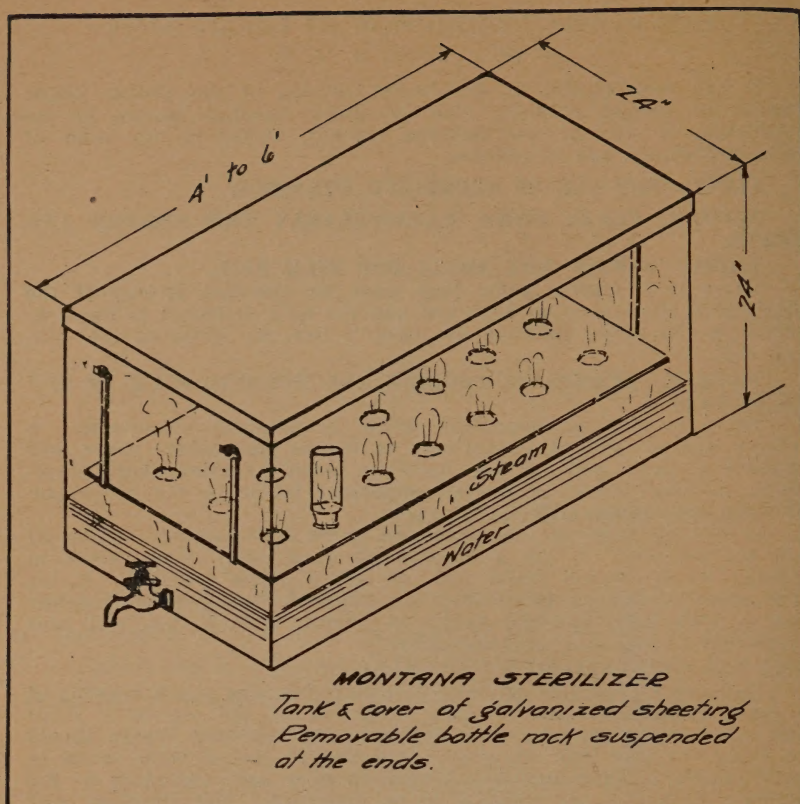
How can we sterilize our milk utensils? On page 4 is a drawing of a plain galvanized tank. It can be placed on the top of a small coal stove, or on one or two oil burners. The sterilizer always should be made not less than 24 inches high and 24 inches wide so as to hold pails and other utensils. Its length may vary according to the number of bottles and utensils to be sterilized. The sterilizer may be used also to supply hot water for other purposes, which is the reason for the spigot.

Bottles and other utensils should first be rinsed in cold or luke warm water. Then they should be washed thoroughly in warm water to which has been added an alkali washing powder. Soap powders, greasy soaps and greasy materials of all kinds should be avoided in washing milk utensils. A stiff brush should be used so as to brush off all adherant substances.

Steam is the best sterilizer. It not only kills bacteria but it warms the utensils so that they dry rapidly and thoroughly which is not only essential from a sanitary standpoint but which also prevents rust and depreciation of metal utensils.

Bottles and other utensils after having been washed thoroughly should be steamed for not less than fifteen minutes. When a tank sterilizer is used the hot water is drawn off through the spigot for washing purposes. Two or three inches, however, are left for steaming the utensils. After the bottles and utensils have been washed they are placed upon the bottle rack or false bottom in the sterilizer which false bottom is slightly higher than the water remaining in the tank. The tank is placed upon a stove or oil burner so as to boil the water. Steam is generated from the boiling water to completely sterilize the utensils in twenty to thirty minutes.

In large dairies when a steam boiler generates the steam the boiler should be connected with a sterilizing oven which can be closed



securely. The utensils should be placed in the oven and the steam turned on and the utensils steamed for not less than fifteen minutes. The practice of running the steam through a hose and of putting the hose into the bottle or utensil and steaming it out for three or four seconds does not sterilize the bottle or utensil.

After utensils have been sterilized, they should be inverted to dry and to prevent dirt from falling into them. Lids must not seal containers while drying; in fact, containers will not dry if sealed with a lid. It is absolutely imperative if containers are to be clean and sweet that they be dried thoroughly, and the best way to do that is to invert them, leave the lid off and let pure air circulate within them. If moisture is left in the container and if in such condition it is closed with a lid, then the container will become sour and musty which sourness and mustiness will be imparted to the next milk or cream placed in the container.

THE SECOND FACTOR—CLEAN COWS, CLEAN UDDERS AND TEATS

To keep cows clean really requires quite a little headwork as well as manual labor. Dry or gravel pastures if available should be saved and used during wet weather. A well drained corral covered with fine gravel (large gravel is liable to cause injured teats) from which the manure is removed daily will assist very materially in keeping cows clean. If neither a good dry pasture nor corral is avail-

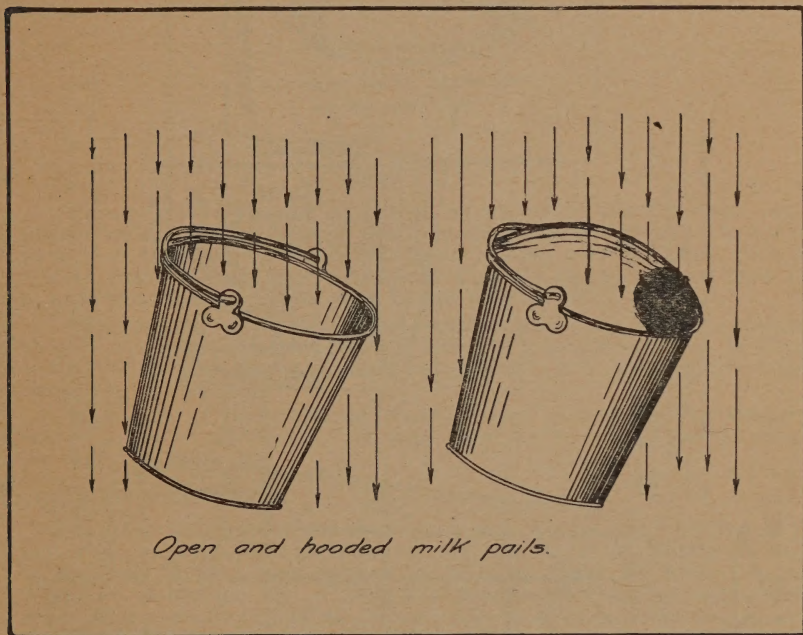
able and the cows become dirty, there is no reasonable excuse why their udders and teats should not be cleaned immediately previous to milking. If they are cleaned at this time it will prevent considerable hair and dirt from falling into the milk during milking. In this connection it is well to remember that the cow's tail should be tied up, or in some way prevented from being switched to and fro at milking time, and thus prevented from knocking or throwing dirt and hair into the milk pail.

THE THIRD FACTOR—THE HOODED OR SMALL-TOP MILK PAIL:

The illustration plainer than words shows the reason for the small-top pail. It prevents considerable dirt and hair by reason of the top covering from falling into the milk pail. All the sterilization in the world goes for naught if after sterilization, dirt and contaminating organisms are thrown into the pail or milk.

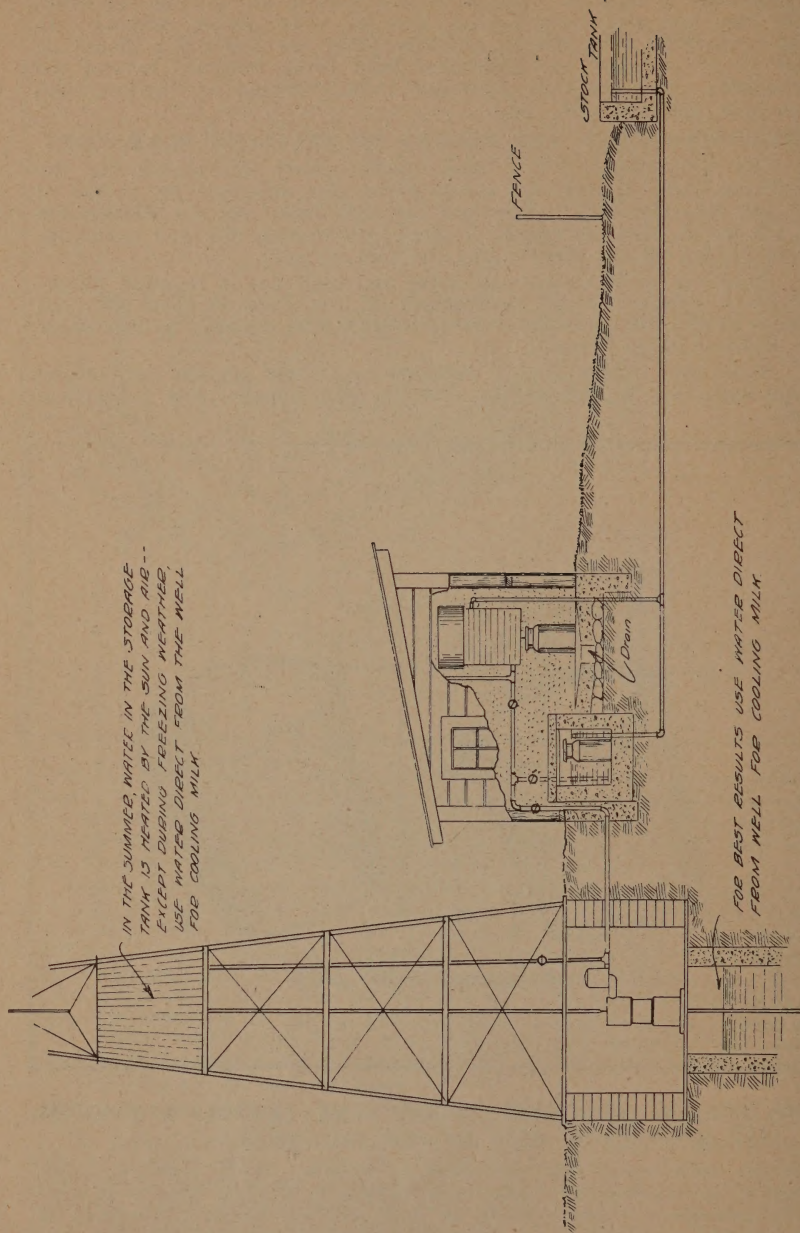
Small-top pails are not expensive and their use is required by the Livestock Sanitary Board regulations. If you have an open pail, you should have a top made for it immediately. This top may be removable or soldered on to the pail.

There are a number of different small-top, hooded or covered pails made, but we believe the small-top pail illustrated is a practical type.



THE FOURTH ESSENTIAL FACTOR—THE IMMEDIATE COOLING AND HOLDING OF MILK AT 50°F. OR LOWER;

The reason for this procedure is simple. It is practically impossible to produce a sterile milk, which is a milk absolutely free from bacteria. A few bacteria in milk are not harmful, provided of course, these bacteria are not pathogenic or disease producing, but billions of bacteria even though they are non-pathogenic and do not



ARRANGEMENT OF WATER SUPPLY FOR MILK HOUSE.

produce a specific contagious or infectious disease may destroy many of the essential food products in the milk and cause digestive disturbances. It is bacterial action that causes milk to sour.

Bacteria attain maturity in about twenty minutes under favorable conditions. They multiply simply by dividing in half; that is, one becomes two; two become four and so on. It has been estimated that one bacterium under favorable conditions and dividing every twenty minutes would yield sixteen hundred trillions in a single day.



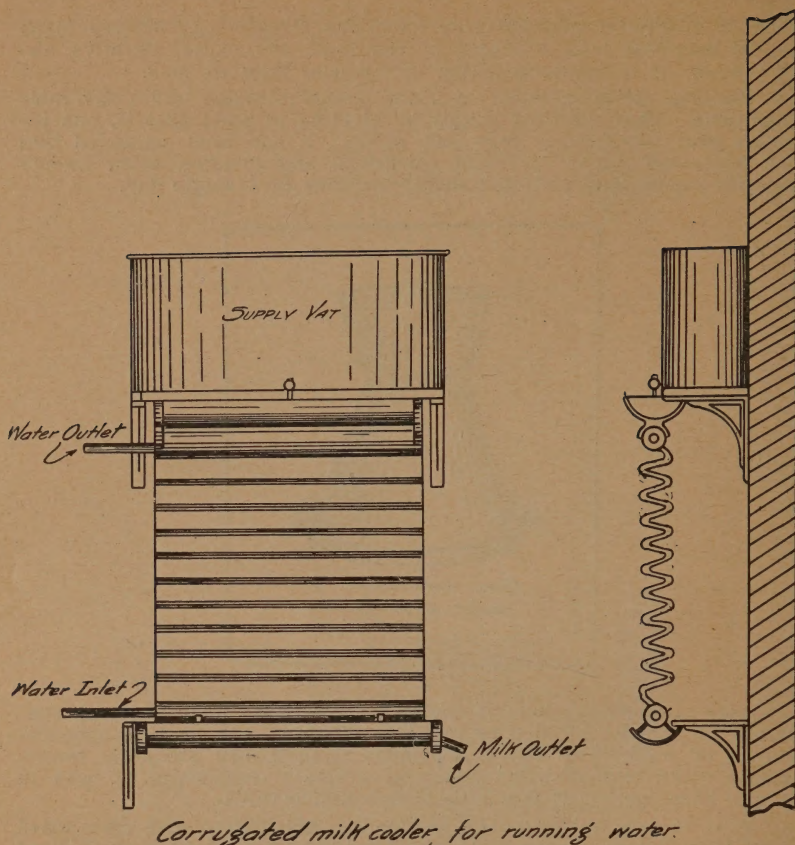
Such a multiplication, of course, is not usual under natural conditions on account of lack of nutritive material, and because bacterial growth is inhibited by the development of their own products. Nevertheless many billions will develop in a single teaspoonful of milk in a very short period if the milk is not KEPT COOL.

That is why milk should be cooled immediately and maintained at 50°F or lower. Bacteria do not grow at a temperature of 50°F or lower, or if they do, it is very exceptional and their development very slow.

Milk even of low bacterial count if kept at a warm temperature will sour in a few hours. If kept cool (50°F) it will keep sweet for days.

DUTY OF CONSUMER:

To keep milk sweet and pure it is just as essential for the consumer to keep the milk delivered to him free from contamination and to maintain it at a temperature of 50°F or lower as it is for the producer to do so. It is also the consumer's duty to thoroughly wash milk containers and to return them in a clean condition to the producer. To fail to do so is just about as great a wrong as it is for the producer to distribute milk in unclean containers. Milk bottles and containers which are not rinsed out and washed immediately after being emptied are difficult to clean because the small particles of milk left in the bottle dry and become adherent to the bottle or container. The best way to clean milk bottles and containers is to rinse them first in cold water, and then to thoroughly wash them in boiling water. If boiling water is used first it will cook part of the milk and make it adhere to the container so much so as to make it very difficult to remove.

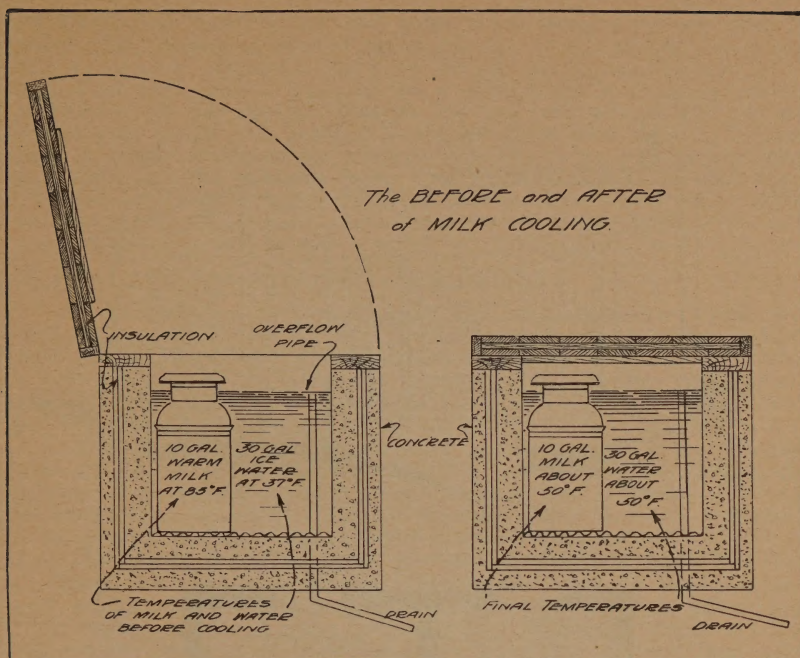


CHARACTER OF UTENSILS:

Always purchase utensils that are easily cleaned and which do not have crevices or cracks or open joints. Milk pails and other metal utensils should have all joints so made or soldered as to do away with cracks or crevices. It is next to impossible to keep thoroughly clean a utensil that has a crack or crevis, for the reason that dirt gets into these cracks, and can only be cleaned out with the greatest difficulty. Many a fine grade of milk and cream has been ruined by contamination from unclean milk pails.

SEPARATORS:

Always rinse and wash and sterilize the removable parts of your separator immediately after each use. Milk particles if left to harden in the separator are difficult to remove. In a few hours they will contain millions of bacteria, and if still there when the separator is used again contamination of the milk and cream will result. Bear in mind that cream will sour very rapidly if the separator is not thoroughly clean and sterilized after each use. The bowl and removable parts should not be put together again until the separator is to be used. The cleaning of the separator is a very important factor in the keeping of cream sweet.



Extra grades of butter only can be made from sweet cream. Rancid cream makes a very poor grade of butter. The use of rancid cream is a detriment to the dairy and creamery industry. Its use injures the reputation of the dairy products from that district, and thus tends to lower the price of butter fat. From an economic as well as from a sanitary stand point every factor should be observed and utilized to produce and deliver sweet, wholesome, pure milk and cream.

Unclean methods in production, improper cooling and the use of rancid cream and sour milk cost the dairy industry millions of dollars annually.

HANDLING CREAM:

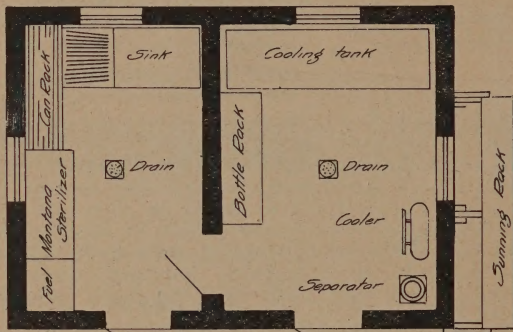
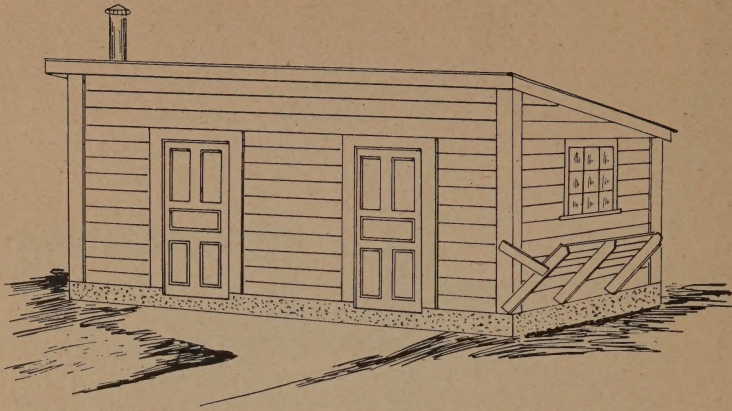
Covers never should be placed tightly on cans containing warm cream or milk.

When the cover is off the opening in the can should be covered with cheese cloth.

Fresh cream or milk never should be mixed with cooled cream or milk until after the fresh cream or milk has been thoroughly cooled.

Cream sours more slowly than milk. The reason for this is: Cream contains more butter fat and less milk sugar than milk. It is bacterial action splitting milk sugar into carbon dioxide and lactic acid that causes milk and cream to sour. Naturally thick cream does not sour as rapidly as thin cream.

Milk should be separated so as to produce 30 to 35% cream. This saves in transportation and retards souring. Cans containing cream or milk should never be left in the sun, or in a warm room. When delivered at the receiving station, they should be placed in the shade. If the weather is warm and ice is not available they should be covered with a blanket soaked in cold water.



Perhaps the best all round milk house for dairies shipping milk or cream in cans. It is small, conveniently arranged, and inexpensive. The cooling tank is sunk below the floor level, to minimize the lifting of cans of milk. Adapted to dairies of from 10 to 30 cows.

The placing of a thoroughly cleaned carrot in a can of cream or milk will tend to prevent the souring of that cream or milk during a thunder storm.

CORRALS AND BARN:

Corrals should be kept clean. Manure should be removed daily from the corral and barn. It should be stored at a point inaccessible to cattle or hogs. It is through the manure more than any other way that such diseases as tuberculosis and contagious abortion are spread. When operations and weather permit, the manure should be spread upon fields. It should be plowed under before cattle or hogs are permitted to graze upon such fields.

Keep your barns clean and white wash them at least twice a year. Have plenty of window space and let all the sunshine possible into your barn. Sunshine and fresh air are the greatest health producers we have. Never build or use a barn which is damp or poorly ventilated. If you do, the chances are you will pay dearly for its use in poor health and lessened production from your cattle. If your barn is poorly ventilated put windows into it just as soon as you can, and don't nail the windows in but put them on hinges so that they can open or tip back and let fresh air into the barn. And don't forget to open these windows so as to keep the air in the barn fresh and free from musty, foul odors.

HEALTH AND CONDITION OF YOUR CATTLE:

A cow does not in herself make the food substances which are contained in milk. Nature has provided the milk producing female with the faculty of extracting certain food essentials from the food which she herself partakes and placing them in the milk which she produces. A cow cannot produce a milk of wholesome quality unless she herself receives good food.

Nature has been good to Montana in placing within the grasses and cereals raised in this state mineral salts, vitamins and other essential food substances to a greater degree than is generally found in such foods in other regions. Montana dairy products produced in a sanitary manner from healthy cows should thus excel, from a food standpoint, the finest dairy products produced in other regions.

Keep your cattle healthy and contented. Montana has required and practiced the tuberculin test for the determination of bovine tuberculosis in dairy cattle longer than any other state. Bovine tuberculosis in most Montana herds is becoming a rarity, but only by constant vigilance and inspection can this disease be eradicated from all herds. Never buy new cattle, and never place new cattle in your herd until after they have passed a negative tuberculin test. Always buy outside cattle subject to a 60-90 day retest. This test will be made free of charge by the Livestock Sanitary Board as finances permit.

Watch your cattle for inflammation of the udder which condition is also called garget, mammitis or mastitis. If this condition develops, isolate the animal immediately and do not use her milk for human consumption. If the milk is fed to other animals it must be boiled before being used. Never let a milker milk a cow suffering from mammitis until all other cows have been milked and always use a separate pail and have the milker clean up immediately after milking. Failure to observe these principles may result in a number of animals becoming infected.

Ropy and stringy and bloody milk in most cases come from cows suffering from mammitis, although ropy and stringy milk also may result from dirty milk pails.

If disease appears in any of your cows, isolate that animal immediately and do not use her milk for human consumption. Boil her milk before feeding to other animals.

To be a successful dairyman, one must be clean personally. It is to be remembered that dairying requires the milking of cows at least twice a day for 365 days in the year. Good succulent food, and a pure water supply for the cattle, and fuel to heat water and sterilize utensils are also necessary factors.

Pleasant surroundings, humane handling and regular milking in addition to good food and pure water are essential if your cattle are to be contented and give their utmost production. Only cattle of good quality and production should be kept. It has been said "Only the extremely rich can afford to keep a Scrub Animal."

U. S. DEPT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
DAIRY DIVISION.

DATE Oct 21, 1911

DRAWN BY W. H. H.

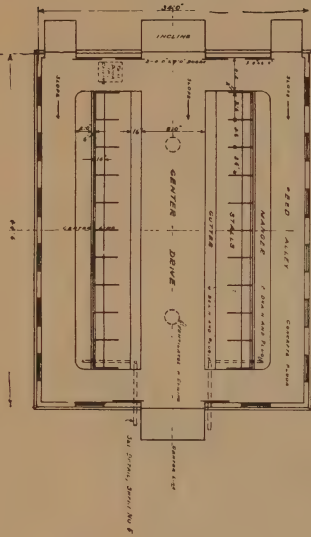
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CHECKED BY W. H. H.

APPROVED BY W. H. H.

FIGURE 107.
A CROSS SECTION OF A
DAIRY BARN.

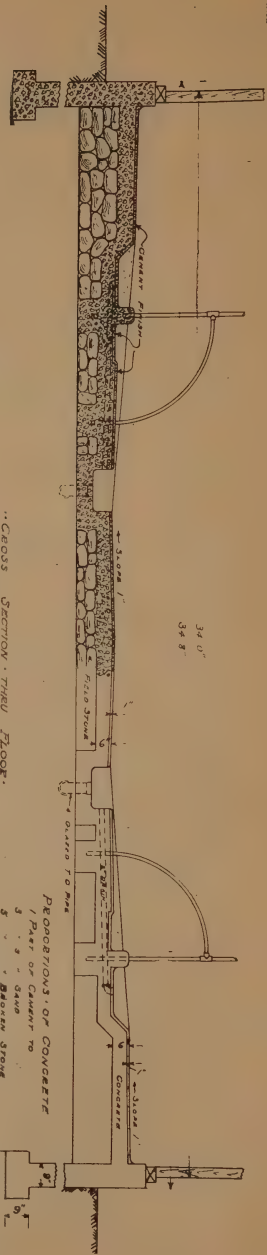
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FLOOR PLAN.

CROSS SECTION - THIRD FLOOR.

PROPORTIONS OF CONCRETE
1 PART OF CEMENT TO
3 " 3 " SAND
5 " CEMENT, FINISH
2 " 1/2 " PART OF CEMENT TO 3 PARTS OF SAND



U. S. DEPT. OF AGRICULTURE
BUREAU OF ANIMAL INDUSTRY,
DAIRY DIVISION.

DATE 1-18-1914

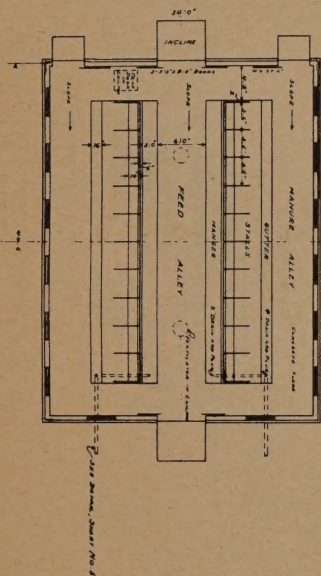
DRAWN BY J. L. L.

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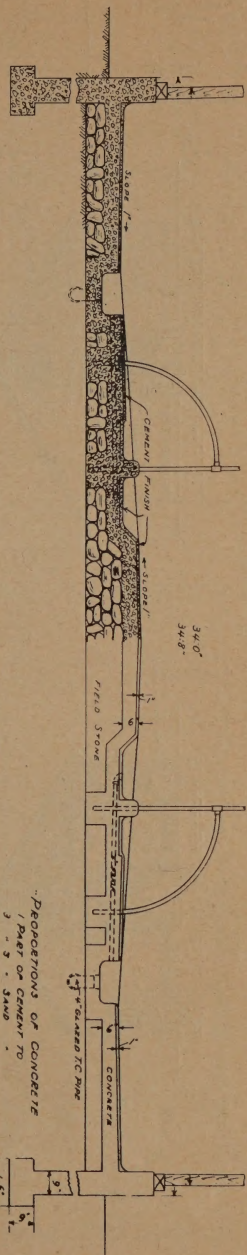
APPROVED BY J. L. L.

FLOOR PLAN



CROSS SECTION - TYPICAL FLOOR

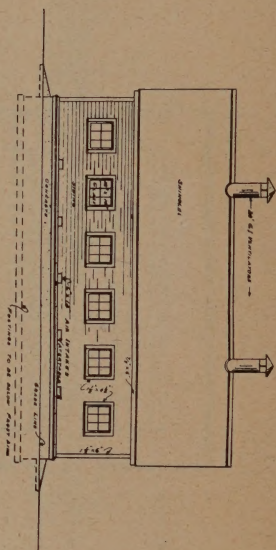
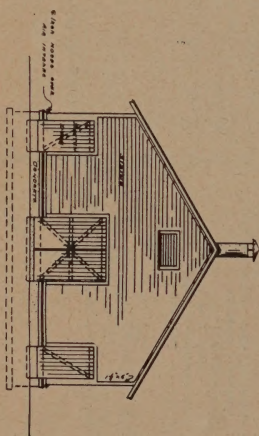
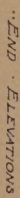
Scale 1/4" = 1'-0"



PROPORTIONS OF CONCRETE

1 PART OF CEMENT TO
3 " 3 " SAND
5 " 3 " BROKEN STONE
CEMENT FINISH.
10 LAYERS 3" THICK - 1 PART OF CEMENT TO 3 PARTS OF SAND
AND 5 " 3 " 1/4" BROKEN STONE

DATE 11-22-11 5 11 11
DRAWN BY GAB TRACED BY _____
CHECKED BY REP APPROVED BY REP



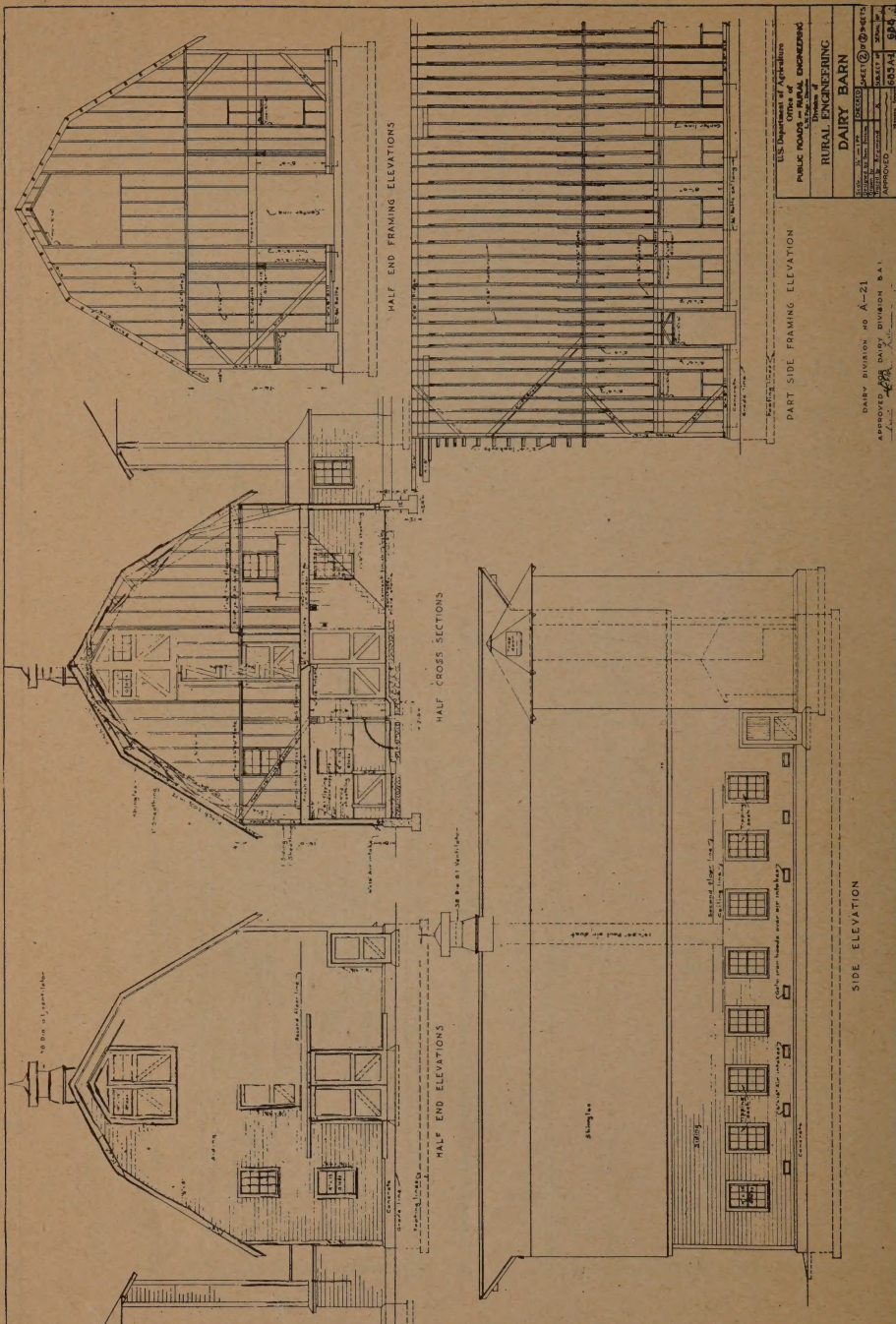
..SIDE · ELEVATIONS.

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...ELEVATIONS -



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U.S. Department of Agriculture BUREAU OF PLANT INDUSTRY Office of RURAL ENGINEERING	
DAIRY BARN	
DESIGNED BY J. H. HARRIS	DATE 1905
DRAWN BY J. H. HARRIS	DATE 1905
CHECKED BY J. H. HARRIS	DATE 1905
APPROVED BY J. H. HARRIS	DATE 1905

DAIRY DIVISION NO A-21
APPROVED DAIRY DIVISION B.A.T.
J. H. HARRIS

Drawn June 15, 1905
Page 17